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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,369	05/15/2006	Noboru Ichinose	PKHF-04053US	9867

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EXAMINER

SALERNO, SARAH KATE

ART UNIT	PAPER NUMBER
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2814

MAIL DATE	DELIVERY MODE
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07/01/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/567,369	Applicant(s) ICHINOSE ET AL.	
	Examiner SARAH K. SALERNO	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,6,9-13,15 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,6,9-13,15 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/11/10</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's amendment/arguments filed on 03/18/10 as being acknowledged and entered. By this amendment claims 2, 3, 5, 7, 8, 14, and 16-20 are canceled, no claims have been added, claims 1, 6, 9-13, 15, and 21 are pending and no claims are withdrawn.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 6 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kryliouk (US Patent 6,350,666) in view of Ichinose et al. (EP 1367657A2)

Claim 1: Kryliouk teaches a semiconductor layer, comprising:

a first layer (substrate) comprising a single crystal substrate; and
a second layer (nitrided layer) comprising a nitride surface of said first layer containing oxygen and nitrogen (Col. 3 lines 20-40; Col. 11-12).

Kryliouk does not teach the single crystal substrate being of a Ga₂O₃ system. Ichinose teaches using a substrate comprising a Ga₂O₃ system for use in light emitting devices. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have

Art Unit: 2814

substituted the single crystal oxide substrate taught by Kryliouk with single crystal β - Ga_2O_3 substrate because of its known use in light emitting devices as taught by Ichinose [0015].

Claim 4: Ichinose teaches the first layer comprises Ga_2O_3 , $(\text{In}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 \leq x < 1$, $(\text{Al}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 \leq x < 1$, $(\text{In}_x\text{Al}_y\text{Ga}_{1-x-y})_2\text{O}_3$ where $0 \leq x < 1$, $0 \leq y < 1$, and $0 \leq x + y < 1$, or the like, as a main constituent [0015].

Claim 6: Kryliouk teaches a semiconductor layer, comprising:

a first layer (substrate) comprising a single crystal substrate; and
a second layer (nitrided layer) comprising a nitride surface of said first layer containing oxygen and nitrogen (Col. 3 lines 20-40; Col. 11-12).

a third layer comprising a GaN system epitaxial layer grown on the second layer (Fig. 1b).

Kryliouk does not teach the single crystal substrate being of a Ga_2O_3 system. Ichinose teaches using a substrate comprising a Ga_2O_3 system for use in light emitting devices. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the single crystal oxide substrate taught by Kryliouk with single crystal β - Ga_2O_3 substrate because of its known use in light emitting devices as taught by Ichinose [0015].

Claim 9: Ichinose teaches the first layer consists of a single crystal β - Ga_2O_3 [0015].

Claim 10: Ichinose teaches the single crystal β - Ga_2O_3 has a prismatic shape having a square in cross section, and its axis direction matches a-axis 100° orientation, b-axis 010° orientation or c-axis 001° orientation [0038-0039].

Claim 11: Kryliouk teaches the first layer comprises $(\text{In}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 < x < 1$ (Col. 4).

Claim 12: Kryliouk teaches the first layer comprises $(\text{Al}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 < x < 1$ (Col. 4).

Claim 13: Kryliouk teaches the first layer comprises $(\text{In}_x\text{Al}_y\text{Ga}_{1-x-y})_2\text{O}_3$ where $0 < x < 1$, $0 < y < 1$, and $0 < x + y < 1$ (Col. 4).

Claim 15: Ichinose teaches the first layer consists of single crystal β - Ga_2O_3 [0015].

Claim 21: Kryliouk teaches a semiconductor layer, comprising:
a first layer (substrate) comprising a single crystal substrate; and
a second layer (nitrided layer) comprising a nitride surface of said first layer which contains oxygen and nitrogen (Col. 3 lines 20-40; Col. 11-12).

wherein the second layer comprises a GaN compound semiconductor (Fig. 1b).

Kryliouk does not teach the single crystal substrate being of a Ga_2O_3 system. Ichinose teaches using a substrate comprising a Ga_2O_3 system for use in light emitting devices. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v.*

Art Unit: 2814

Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the single crystal oxide substrate taught by Kryliouk with single crystal β -Ga₂O₃ substrate because of its known use in light emitting devices as taught by Ichinose [0015].

Response to Arguments

4. Applicant's arguments with respect to claims 1, 4, 6, 9-13, 15 and 21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to whose telephone number is (571)270-1266. The examiner can normally be reached on M-R 8:00-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2814

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Wael M Fahmy/
Supervisory Patent Examiner, Art
Unit 2814

/S. K. S./
Examiner, Art Unit 2814